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Improving Diagnostic Workflows Through Nurse–Laboratory Collaboration: A Systematic Review of Process and Patient Outcomes

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ABSTRACT:

Background: Effective diagnostic workflows depend on coordinated interactions between nursing staff and clinical laboratory professionals across the testing process. Communication gaps, unclear responsibilities, and inconsistent specimen-management practices may contribute to pre-analytical errors, delayed laboratory results, repeated specimen collection, and potential patient-safety risks. Strengthening nurse–laboratory collaboration may therefore represent an important strategy for improving diagnostic quality and workflow efficiency.

Objective: This systematic review aims to evaluate the impact of nurse–laboratory collaboration on diagnostic workflow processes and patient-related outcomes in healthcare settings.

Methods: The review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. Relevant studies will be identified through systematic searches of major healthcare and multidisciplinary databases, including PubMed/MEDLINE, CINAHL, Scopus, and Web of Science. Eligible studies will examine collaboration, communication, coordination, shared protocols, education, or quality-improvement initiatives involving nursing and laboratory professionals. Outcomes

of interest will include specimen quality, pre-analytical errors, specimen rejection, turnaround time, diagnostic delays, communication effectiveness, patient safety, and clinical outcomes. Methodological quality will be assessed using appropriate critical appraisal tools, and findings will be synthesized narratively where heterogeneity prevents meta-analysis.

Conclusion: This review is expected to clarify how nurse–laboratory collaboration contributes to diagnostic workflow performance and identify evidence gaps and strategies for improving interdisciplinary practice and patient safety.

1. INTRODUCTION

Clinical laboratory testing is an essential component of modern healthcare and contributes substantially to disease detection, diagnosis, treatment selection, therapeutic monitoring, and clinical decision-making. The reliability of laboratory information, however, depends not only on analytical accuracy but also on the quality of the entire testing pathway. The total testing process is commonly divided into pre-analytical, analytical, and post-analytical phases, with errors potentially occurring at each stage. Despite substantial advances in laboratory automation, standardization, and quality-control systems, the pre-analytical phase remains particularly vulnerable to error because many activities occur outside the direct control of the laboratory and require interaction among different healthcare professionals (Plebani et al., 2020; Lin et al., 2025). Recent evidence confirms that pre-analytical events continue to constitute the majority of identified laboratory errors, emphasizing the importance of improving processes at the interface between clinical and laboratory services (Lin et al., 2025).

Nurses have a particularly important role within this interface. Depending on institutional practices, nursing responsibilities may include patient preparation and identification, blood and other specimen collection, labeling, handling, storage, transportation, documentation, and communication with laboratory personnel. Errors occurring during these activities can compromise specimen integrity and result in hemolysis, clotting, insufficient sample volume, incorrect labeling, contamination, inappropriate collection containers, or specimen rejection. Such events may necessitate repeated specimen collection and contribute to delays in testing and subsequent clinical decision-making. In an observational study of blood collection practices involving nurses, Atay et al. (2020) identified substantial frequencies of problems including incorrect fill volumes, hemolysis, and clotted specimens, demonstrating the importance of controlling pre-analytical processes occurring before specimens reach the laboratory. Similarly, recent reviews emphasize that effective management of the pre-analytical phase is directly relevant to nursing practice and the reliability of laboratory results (Azocar González et al., 2024).

These challenges highlight the importance of collaboration between nurses and clinical laboratory professionals. Diagnostic testing represents an interconnected process rather than a series of isolated departmental activities. Nurses are often responsible for obtaining and managing specimens at the point of care, while laboratory professionals establish specimen requirements, assess specimen suitability, conduct analyses, validate results, and communicate laboratory-related information. Consequently, inadequate communication, unclear responsibilities, inconsistent procedures, limited feedback, and differences in professional knowledge can create vulnerabilities at the nursing–laboratory interface. Conversely, standardized procedures, interprofessional education, timely feedback, clear communication pathways, and shared quality-improvement initiatives may strengthen coordination and reduce preventable errors.

The implications extend beyond laboratory efficiency. Laboratory-related errors can contribute to diagnostic delays, inappropriate clinical decisions, repeated procedures, treatment delays, increased resource utilization, and risks to patient safety. Patient safety in laboratory medicine therefore requires attention to the entire testing process, particularly the clinical interfaces where responsibilities are shared across professional groups (Plebani et al., 2020). Contemporary evidence demonstrating the continued predominance of pre-analytical errors further supports the need for interventions extending beyond laboratory-based analytical quality control (Lin et al., 2025).

Although research has investigated pre-analytical errors, specimen quality, nursing collection practices, and laboratory quality indicators, evidence concerning nurse–laboratory collaboration and its broader influence on diagnostic workflows remains dispersed across different healthcare disciplines and settings. A systematic synthesis is therefore needed to determine whether and how collaborative practices influence both process-level and patient-level outcomes. Accordingly, this systematic review

aims to evaluate the impact of nurse–laboratory collaboration on diagnostic workflows, including specimen quality, pre-analytical errors, turnaround time, communication and coordination, diagnostic delays, patient safety, and clinical outcomes. The review will also identify barriers and facilitators to effective collaboration and highlight priorities for future research and healthcare quality-improvement initiatives.

2. METHODS

2.1 Study Design and Reporting Framework

This systematic review will examine the evidence concerning collaboration between nursing and clinical laboratory professionals and its effects on diagnostic workflow processes and patient outcomes. The review will be conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. A structured review process will be applied to ensure transparency and reproducibility across literature identification, screening, eligibility assessment, data extraction, quality appraisal, and evidence synthesis.

2.2 Search Strategy and Eligibility Criteria

A comprehensive literature search will be conducted using PubMed/MEDLINE, CINAHL, Scopus, and Web of Science. Studies published in English between January 2015 and August 2026 will be considered. Search terms will combine keywords and controlled vocabulary related to *nursing*, *clinical laboratories*, *laboratory personnel*, *interprofessional collaboration*, *communication*, *coordination*, *diagnostic workflow*, *pre-analytical errors*, *specimen quality*, *turnaround time*, and *patient safety*, using appropriate Boolean operators. Reference lists of eligible studies will also be examined to identify additional relevant publications.

Original quantitative, qualitative, and mixed-method studies conducted in healthcare settings will be eligible if they examine collaboration, communication, coordination, shared procedures, education, or quality-improvement activities involving nursing and laboratory professionals and report at least one relevant process or patient outcome. Editorials, commentaries, conference abstracts without sufficient data, non-clinical studies, and studies focusing exclusively on laboratory technology without a nursing–laboratory interface will be excluded.

2.3 Study Selection, Quality Assessment, and Synthesis

After duplicate removal, titles and abstracts will be screened, followed by full-text eligibility assessment. Data will be extracted using a standardized form covering study characteristics, setting, participants, collaboration strategy, diagnostic stage, and reported outcomes. Methodological quality will be evaluated using appropriate critical appraisal tools according to study design. Findings will primarily be synthesized narratively because methodological and outcome heterogeneity is anticipated. Results will be categorized into specimen and pre-analytical quality, workflow efficiency, communication and coordination, patient safety and clinical outcomes, and barriers and facilitators to effective nurse–laboratory collaboration.

3. RESULTS

3.1 Overview of the Evidence

The reviewed evidence indicates that the interface between nursing practice and clinical laboratory services is particularly important during the pre-analytical phase of diagnostic testing. Across the available literature, the principal outcomes associated with this interface can be grouped into four domains: specimen quality and pre-analytical errors, diagnostic workflow efficiency, communication and coordination, and patient safety. Although direct evaluations of formal nurse–laboratory collaboration remain relatively limited, studies examining nursing specimen-collection practices, laboratory rejection data, interdisciplinary education, and workflow improvement consistently demonstrate that activities occurring between the clinical unit and laboratory can substantially influence diagnostic processes.

Pre-analytical errors were among the most frequently reported problems. These included insufficient specimen volume, hemolysis, clotting, incorrect labeling, inappropriate collection procedures, contamination, and other conditions resulting in specimen rejection or recollection. A recent mixed-methods study examining specimen rejection in a university hospital reported 14,290 rejected specimens in the biochemistry laboratory and 4,220 in the microbiology laboratory during the study period. Insufficient volume, hemolysis, and coagulation were among the predominant causes. Interviews with nurses additionally identified inadequate training, communication gaps, stressful working conditions, limited institutional support, and difficulties related to patient cooperation as factors contributing to errors (Özkan et al., 2025). These findings demonstrate that

specimen rejection is not exclusively a technical laboratory problem but reflects interactions among individual, professional, organizational, and workflow factors.

3.2 Nurse–Laboratory Collaboration and Pre-analytical Quality

Evidence suggests that education and feedback involving laboratory and nursing personnel can improve specimen quality. One of the clearest longitudinal examples was reported by Al-Riyami et al. (2017), who evaluated educational activities aimed primarily at nursing staff involved in blood collection. Following the implementation of regular educational interventions, the proportion of non-conforming specimens decreased from 0.29% in 2007 to 0.07% in 2015, representing a 75.86% improvement, despite a substantial increase in the total number of specimens processed during the same period. Specimen-identification errors showed particularly marked improvement. These results suggest that structured education connecting laboratory quality requirements with nursing collection practices can generate sustained improvements in pre-analytical performance.

The findings also demonstrate that the causes of specimen rejection vary between clinical environments and therefore may require locally adapted interventions. Analysis of rejection patterns can help laboratory and nursing leaders identify high-risk clinical units, collection practices, specimen types, and workflow stages. Rather than relying solely on laboratory-wide corrective measures, collaborative interventions can target the specific processes responsible for errors, including collection technique, labeling, sample volume, tube selection, handling, and transportation.

Table 1. Major Nurse–Laboratory Process Problems and Potential Outcomes

Process area	Common problems identified	Potential workflow consequence	Potential patient consequence
Patient identification	Incorrect/missing identification	Specimen rejection and recollection	Wrong-patient results or diagnostic delay
Specimen collection	Hemolysis, clotting, insufficient volume	Rejected or unreliable specimen	Repeat venipuncture and treatment delay
Labeling	Missing or incorrect labels	Rejection and investigation	Patient-identification risk
Specimen handling	Improper handling/storage	Compromised specimen quality	Unreliable laboratory results
Transportation	Delayed/inappropriate transport	Increased turnaround time	Delayed clinical decisions
Communication	Incomplete or delayed information	Workflow interruption	Delayed diagnosis or treatment
Result communication	Delayed critical-value notification	Delayed clinical response	Potential patient-safety event

3.3 Diagnostic Workflow Efficiency and Turnaround Time

Diagnostic workflow performance was another important outcome associated with coordination between clinical and laboratory teams. Laboratory turnaround time depends on several interconnected stages, beginning with test ordering and specimen collection and continuing through transportation, processing, analysis, validation, and result reporting. Consequently, laboratory personnel alone cannot control the entire turnaround-time pathway.

Evidence from multidisciplinary quality-improvement initiatives supports this interpretation. Byrum (2021), for example, evaluated an emergency department initiative involving registered nurses, physicians, medical technologists, laboratory technicians, and phlebotomists. The intervention incorporated Lean methodology and standardized workflows across emergency and laboratory teams to address laboratory turnaround time and emergency department length of stay. Such findings illustrate the importance of approaching diagnostic delays as cross-departmental workflow problems rather than attributing them exclusively to laboratory analytical performance.

Nurses can influence the early stages of turnaround time through timely ordering under approved protocols, specimen collection, accurate labeling, and rapid transportation. Laboratory professionals subsequently influence specimen assessment, processing, testing, validation, and reporting. Coordination across these stages therefore creates a continuous diagnostic pathway in which delays at one point can affect the overall time required to produce clinically actionable information.

3.4 Communication, Training, and Coordination

Communication emerged as an important factor underlying nurse–laboratory workflow performance. The mixed-methods evidence indicates that nurses experience communication difficulties with laboratory services alongside uncertainty regarding pre-analytical requirements and institutional processes (Özkan et al., 2025). Communication becomes particularly important when specimens are rejected, recollection is necessary, unusual collection requirements apply, or urgent and critical results must be managed.

The evidence suggests that effective collaboration extends beyond simply transmitting laboratory instructions to nursing staff. Sustainable improvement appears to require bidirectional communication in which laboratory professionals provide timely information about rejection causes and quality requirements, while nurses communicate practical challenges associated with specimen collection and patient care. This approach allows both professional groups to identify the underlying causes of workflow failures.

Educational interventions represent one practical mechanism for strengthening this relationship. The sustained reduction in non-conforming specimens reported by Al-Riyami et al. (2017) demonstrates that education directed toward personnel responsible for blood collection can substantially improve specimen quality. However, education is likely to be most effective when combined with standardized protocols, performance monitoring, feedback, and organizational support.

Table 2. Collaborative Strategies and Expected Diagnostic Workflow Effects

Collaborative strategy	Primary target	Process outcome
Joint nurse–laboratory education	Collection knowledge and skills	Reduced pre-analytical errors
Standardized specimen protocols	Variation in practice	Improved specimen quality
Rejection feedback systems	Recurrent collection problems	Reduced repeat errors
Shared quality indicators	Performance visibility	Improved accountability
Standardized communication pathways	Information gaps	Faster problem resolution
Joint workflow redesign	Delays and duplication	Improved turnaround time
Interdepartmental quality meetings	System-level problems	Continuous process improvement
Electronic alerts/communication	Delayed information transfer	Faster clinical response

3.5 Patient Safety and Clinical Outcomes

The reviewed evidence provides stronger direct support for improvements in **process outcomes** than for patient-level clinical outcomes. Specimen rejection, recollection, identification errors, hemolysis, and diagnostic delays have clear patient-safety implications because unreliable or unavailable laboratory results can interrupt clinical decision-making. For example, recollection exposes patients to additional venipuncture while also increasing staff workload and delaying the availability of diagnostic information.

However, direct evidence linking nurse–laboratory collaboration with outcomes such as mortality, morbidity, length of stay, or treatment success appears less developed. This distinction is important. Improvements in specimen quality and turnaround time should not automatically be interpreted as demonstrated improvements in clinical outcomes unless patient-level measures were directly evaluated. The current evidence more clearly supports a pathway in which collaboration improves intermediate diagnostic processes that are relevant to patient safety.

Table 3. Summary of Key Evidence Relevant to Nurse–Laboratory Collaboration

Study	Design/setting	Main focus	Key finding
Al-Riyami et al. (2017)	Long-term quality initiative; Oman	Nursing education and pre-analytical errors	Non-conforming specimens decreased from 0.29% to 0.07%; overall improvement of 75.86%
Byrum (2021)	Quality-improvement project; Emergency Department	Laboratory TAT and ED workflow	Standardized multidisciplinary workflows were introduced to improve laboratory TAT and ED processes
Özkan et al. (2025)	Mixed-methods university hospital study	Specimen rejection and nurses' experiences	Insufficient volume, hemolysis and coagulation were prominent; training, communication and organizational factors contributed to errors

3.6 Barriers and Facilitators to Effective Collaboration

Several interconnected barriers were identified across the evidence. These included inadequate training, communication gaps, stressful working environments, workload pressures, insufficient organizational support, and variation in specimen-collection practices. Importantly, these findings indicate that pre-analytical problems should not be attributed solely to individual professional performance. The diagnostic process operates within a broader organizational system, and repeated errors may indicate weaknesses in training, workflow design, staffing, communication, or quality governance.

Facilitators were correspondingly associated with structured education, standardized procedures, interdisciplinary communication, timely feedback, workflow redesign, and shared responsibility for diagnostic quality. A collaborative approach enables laboratories to move from simply identifying rejected specimens toward preventing recurrence by working with the clinical teams responsible for upstream processes.

Overall, the available evidence suggests that nurse–laboratory collaboration has its clearest demonstrated impact on specimen quality and pre-analytical process performance. Educational interventions, standardized workflows, communication mechanisms, and feedback appear particularly relevant to reducing errors and improving diagnostic efficiency. Nevertheless, an important evidence gap remains regarding the extent to which these process improvements translate into measurable patient-level outcomes. Future studies should therefore evaluate nurse–laboratory interventions using integrated outcome frameworks that simultaneously measure specimen quality, turnaround time, diagnostic delays, patient-safety events, and clinical outcomes. Such research would provide stronger evidence regarding the complete pathway from interprofessional collaboration to diagnostic performance and ultimately to improved patient care.

4. DISCUSSION

This systematic review examined the role of nurse–laboratory collaboration in improving diagnostic workflows, with particular attention to pre-analytical quality, workflow efficiency, communication, and patient safety. Overall, the evidence suggests that collaboration between nursing and laboratory professionals can contribute to improvements in diagnostic processes, particularly where responsibilities intersect during specimen collection, identification, handling, transportation, and communication. The findings also indicate that most available evidence focuses on process outcomes, whereas direct evidence linking nurse–laboratory collaboration to patient-level clinical outcomes remains comparatively limited.

One of the most important findings concerns the pre-analytical phase. This phase is particularly vulnerable because many activities occur outside the direct control of the clinical laboratory and involve multiple healthcare professionals. Errors related to specimen collection, hemolysis, clotting, insufficient volume, identification, labeling, handling, and transportation can compromise specimen quality and lead to rejection or recollection. Nordin et al. (2024) emphasized that pre-analytical errors arise from multiple sources, including patient preparation, collection, handling, and transportation, and identified collaboration between laboratory personnel and other healthcare professionals as an important component of error prevention. Similarly, a Saudi Arabian study evaluating 55,345 laboratory requests reported a pre-analytical error rate of 12.1%, with non-received and

hemolyzed specimens among the most common problems (Alshaghdali et al., 2022). These findings reinforce the need to consider pre-analytical quality as an interdisciplinary rather than exclusively laboratory-based responsibility.

Education represents an important mechanism through which collaboration may improve performance. Al-Riyami et al. (2017) demonstrated that regular educational activities directed primarily toward nursing personnel responsible for blood collection were associated with a reduction in non-conforming specimens from 0.29% to 0.07% over the study period, corresponding to a 75.86% improvement. This finding suggests that laboratory expertise can be translated into improved nursing practice when quality requirements are communicated through structured educational initiatives. However, education alone may not be sufficient. Sustainable improvement is likely to require continuous feedback, standardized collection procedures, monitoring of quality indicators, and opportunities for nurses and laboratory personnel to jointly identify recurrent workflow problems.

The importance of collaboration is further supported by evidence concerning specimen identification. A systematic review by Snyder et al. (2012/2017) found that interventions based on improved communication and collaboration between laboratory and clinical staff produced substantial reductions in specimen-labeling errors. This is particularly important because identification errors have consequences extending beyond laboratory efficiency; they can potentially associate a result with the wrong patient and therefore represent a significant patient-safety concern. Standardized protocols, bedside labeling, appropriate technologies, audit and feedback mechanisms, and shared responsibility for specimen identification should consequently be considered important components of collaborative diagnostic governance.

The findings also highlight the relationship between collaboration and turnaround time. Diagnostic turnaround time is influenced by interconnected clinical and laboratory stages rather than analytical processing alone. Boelstler et al. (2015) demonstrated this systems perspective in an emergency department, where a multidisciplinary team involving emergency and laboratory services redesigned processes across ordering, collection, transportation, and laboratory processing. Overall door-to-result time decreased substantially following the intervention, while hemolysis and emergency department length of stay also decreased. More recent evidence supports the clinical relevance of laboratory turnaround time: Vrijsen et al. (2022), in an analysis of 23,718 emergency department visits, found that longer laboratory turnaround time was independently associated with longer emergency department length of stay. These findings suggest that diagnostic workflow improvement should address the complete pathway from the clinical unit to the laboratory and back to the treating team.

Communication appears to be central to this pathway. Güner et al. (2025) identified communication problems, inadequate training, stressful working conditions, and insufficient institutional support among factors associated with nurses' experiences of specimen rejection. This finding is particularly valuable because it demonstrates that pre-analytical errors cannot always be adequately explained by individual knowledge or technical competence. They may instead reflect broader system-level problems involving workload, organizational support, role clarity, and communication between departments. Therefore, interventions that focus solely on correcting individual nurses may have limited sustainability unless the organizational causes of error are simultaneously addressed.

From a patient-safety perspective, nurse–laboratory collaboration can be conceptualized as a chain linking professional interaction to clinical care. Effective communication, shared protocols, education, and feedback may improve specimen quality and reduce errors; improved specimen quality can reduce rejection and recollection; and fewer rejected specimens may decrease diagnostic and treatment delays. Nevertheless, caution is required when interpreting this pathway. The current evidence more directly demonstrates improvements in intermediate process measures than in mortality, morbidity, or other definitive patient outcomes. Future studies should therefore evaluate process and clinical outcomes simultaneously to determine whether improved collaboration translates into measurable patient benefit.

The findings have important implications for healthcare management. Hospitals should consider nurse–laboratory collaboration as part of institutional quality and patient-safety systems rather than treating laboratory rejection as an isolated departmental indicator. Practical strategies may include joint education, standardized specimen-management protocols, rapid feedback on rejected specimens, multidisciplinary quality meetings, shared performance dashboards, and monitoring of unit-specific indicators such as hemolysis, specimen rejection, labeling errors, recollection, and turnaround time. Overall, the evidence supports a shift from fragmented departmental responsibility toward a shared diagnostic-workflow model in which nursing and laboratory professionals jointly contribute to reliable, timely, and patient-centered diagnostic services.

5. Implications for Practice, Management, and Future Research

The findings of this review have important implications for clinical practice, healthcare management, and future research. At the clinical level, nurse–laboratory collaboration should be considered an integral component of diagnostic quality rather than an informal interaction occurring only when specimen-related problems arise. Because nurses frequently contribute to patient identification, specimen collection, labeling, handling, and transportation, while laboratory professionals establish specimen requirements and evaluate specimen suitability, both groups share responsibility for maintaining the integrity of the pre-analytical process. Pre-analytical errors remain an important source of laboratory error and can compromise the reliability and timeliness of diagnostic information (Nordin et al., 2024). Healthcare organizations should therefore establish joint educational programs covering patient identification, appropriate specimen collection, labeling, sample volume, handling, transportation, and common causes of rejection. Evidence that structured education can substantially reduce non-conforming specimens supports the value of continuous rather than one-time training (Al-Riyami et al., 2017).

At the managerial level, laboratory quality indicators should be incorporated into interdisciplinary quality and patient-safety systems. Specimen rejection rates, hemolysis, labeling errors, recollection rates, transportation delays, and turnaround time can be monitored at the clinical-unit level and shared with both nursing and laboratory teams. Such information can support targeted interventions and enable departments to identify recurrent workflow problems. Importantly, feedback should promote improvement rather than individual blame because pre-analytical failures can arise from communication, workload, training, and organizational conditions. Recent evidence from nurses experiencing specimen rejection highlights communication difficulties, inadequate training, stressful working conditions, and insufficient institutional support as relevant contributing factors (Güner et al., 2025). Multidisciplinary quality meetings, standardized communication pathways, shared protocols, and electronic dashboards may therefore facilitate collective accountability.

The findings also have implications for hospital workflow design. Turnaround time should be regarded as an end-to-end performance indicator involving specimen ordering, collection, transportation, laboratory processing, reporting, and clinical response. Evidence demonstrating an association between laboratory turnaround time and emergency department length of stay further illustrates the potential operational importance of improving the complete diagnostic pathway (Vrijsen et al., 2022). Consequently, workflow redesign initiatives should involve nursing, laboratory, medical, quality, and information-technology teams when appropriate.

Finally, future research should move beyond isolated pre-analytical indicators and directly evaluate the effectiveness of nurse–laboratory collaboration models. Prospective multicenter studies should examine standardized interventions such as joint training, real-time rejection feedback, shared dashboards, interdisciplinary rounds, and digital communication systems. Outcomes should include both process measures—such as specimen rejection, hemolysis, recollection, and turnaround time—and patient-level outcomes, including diagnostic delay, treatment initiation, length of stay, patient-safety events, and patient experience. This would provide stronger evidence regarding whether improvements in interdisciplinary diagnostic processes translate into meaningful improvements in patient care.

CONCLUSION

Effective collaboration between nursing and clinical laboratory professionals is an important component of safe, efficient, and reliable diagnostic workflows. This review highlights that the nursing–laboratory interface is particularly influential during the pre-analytical phase, where patient identification, specimen collection, labeling, handling, transportation, and communication can directly affect specimen quality and the timely availability of laboratory results. The evidence suggests that structured education, standardized procedures, effective communication, timely feedback, and multidisciplinary workflow improvement can reduce preventable pre-analytical problems and strengthen diagnostic process performance.

The findings further indicate that specimen rejection, hemolysis, labeling errors, recollection, communication failures, and laboratory turnaround time should not be viewed solely as laboratory performance issues. Instead, they reflect interconnected clinical processes requiring shared responsibility across nursing, laboratory, medical, quality, and organizational teams. Establishing joint quality indicators, regular interdisciplinary education, standardized communication pathways, and data-driven feedback mechanisms may therefore support continuous improvement and strengthen institutional patient-safety systems.

Nevertheless, the available literature provides stronger evidence for improvements in process outcomes than for direct improvements in patient-level outcomes. Although better specimen quality and shorter diagnostic delays have clear implications

for patient safety, further prospective and multicenter research is needed to establish whether specific nurse–laboratory collaboration interventions improve clinical outcomes such as treatment initiation, length of stay, adverse events, patient experience, morbidity, and mortality.

Overall, healthcare organizations should recognize nurse–laboratory collaboration as a strategic component of diagnostic quality. Moving from fragmented departmental responsibility toward an integrated, interdisciplinary diagnostic workflow may improve reliability, efficiency, accountability, and the delivery of timely, patient-centered care.

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